DETAILED ACTION

1. This Office Action follows a response filed on December 6, 2010. Claims 1, 7, 9, 17 and 20 have been amended; claims 3, 5, 6, 8, 12 and 14-16 have been cancelled; claim 22 has been added.

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 6, 2010 has been entered.

3. In view of the amendment(s) and remarks the rejection of claims 7, 9 ,10 and 20 under 35 U.S.C. 112, first paragraph, and the rejection of claims 1, 2, 4, 9-11, 13 and 17-21 are rejected under 35 U.S.C. 112, second paragraph have been withdrawn.

4. Claims 1, 2, 4, 7, 9-11, 13, and 17-22 are pending.

EXAMINER'S AMENDMENT

5. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Stephen D. Harper (Reg. No. 33,243) on December 23, 2010.

6. Claim 1, has been amended as follows:

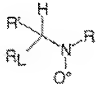
Line 2: after the word "units" delete comma and insert the colon;

Line 4: after the word "the copolymer" delete the remaining part of the claim and insert --- and selected from the group consisting of linear and branched $C_1 - C_{12}$ alkyl acrylates, polyethylene glycol acrylate, polyethylene glycol methacrylate and dienes, b) the second (M_2), the homopolymer of which has a T_{g2} of greater than 20°C, representing at most 50% by weight of the total weight of the copolymer and selected from the group consisting of styrene, styrene derivatives, acrylic acid, methacrylic acid, norbomyl acrylate, methyl methacrylate, acrylonitrile and methacrylonitrile, wherein at least 5% by weight of the total weight of the copolymer is represented by a hydrophilic monomer unit selected from the group consisting of polyethylene glycol acrylate, polyethylene glycol methacrylate, acrylic acid and methacrylic acid,

said gradient copolymer comprising at least one monomer M_i such that the probability of encountering M_i in any standardized position x situated on the polymer chain is nonzero; and wherein said gradient copolymer is soluble or dispersible in both water and in organic solvents at a concentration greater than or equal to 5%, and wherein said copolymer has number average and weight average masses of between 5,000 g/mol and 1,000,000 g/mol and a polydispersity index of between 1.1 and 2.5, said copolymer further comprising nitroxide residue unit.---.

Claim 7, line 4: after the word "and" delete the word "of";

line 7: after the word "mixture" delete the remaining part of the claim and insert --- and selected from the group consisting of linear and branched $C_1 - C_{12}$ alkyl acrylates, polyethylene glycol acrylate, polyethylene glycol methacrylate and dienes, the second (M_2), the homopolymer of which has a T_{g2} of greater than 20°C, representing at most 50% by weight of the total weight of the mixture and selected from the group consisting of styrene, styrene derivatives, acrylic acid, methacrylic acid, norbomyl acrylate, methyl methacrylate, acrylonitrile and methacrylonitrile, wherein at least 5% by weight of the total weight of the mixture is a hydrophilic monomer selected from the group consisting of polyethylene glycol acrylate, polyethylene glycol methacrylate, acrylic acid and methacrylic acid, wherein the agent for controlling the polymerization is a nitroxide of general formula (I):



wherein R' and R, which are identical or different and which are optionally connected so as to form a ring, are alkyl groups having between 1 and 40 carbon atoms which are optionally substituted by hydroxyl, alkoxy or amino groups; and where R_L is a monovalent group with a molar mass of greater than 16 g/mol which can be a phosphorus group or an aromatic group.---.

Claim 9, the last line: delete the words "from 0 to" and insert –at most---.

Claim 10, after the words "amino groups" insert period and delete semicolon and the last two lines.

Claim 22 has been amended as follows:

Line 2: after the words "selected from" insert ---the group consisting of---;

Line 3: after the words "M_2 is" insert ---a mixture of---.

Allowable Subject Matter

7. Claims 1, 2, 4, 7, 9-11, 13, and 17-22 are allowed.

8. The following is a statement of reasons for the indication of allowable subject matter: the present claims are allowable over the closest references: Matyjaszewski et al. "Gradient copolymers by atom transfer radical polymerization", *J. Phys. Org. Chem.*, 2000, **13**, p. 775-786, and Nesvadba et al. (U.S. Patent 6,262,206).

Matyjaszewski discloses that gradient copolymers have a continuous change in composition from one end of the chain to the other. In order to achieve this continuous change in instantaneous composition, all chains must be initiated simultaneously, and must survive until the end of the polymerization. Therefore, a living (ionic) or controlled/living radical polymerization technique must be employed, as the significant presence of chain- breaking reactions would lead to heterogeneity in both composition and molecular weight (page 775, right column through page 776, left column).

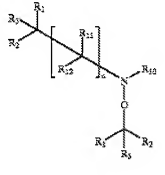
Gradient copolymers may be prepared via ATRP copolymerization of two or more monomers with different homopolymerization reactivity ratios (e.g., rl >>r2, where rl may be greater than 1 and r2 may be less than 1). As the differences in the two

values of reactivity ratio increase, so does the steepness of the gradient in instantaneous composition (pages 777-778). Matyjaszewski exemplifies that both gradient copolymers of styrene and acrylonitrile contained 59 mol% acrylonitrile had number average molecular weights of 11,000 and 15,000, and polydispersities 1.15 and 1.08 (page 783, Fig. 13).

Matyjaszewski discloses that the use of nitroxide mediated polymerization has been shown to be effective for synthesis of not only homopolymers and block copolymers, but also random and statistical copolymers of styrene. These copolymers can be formed using nitroxide-mediated CRP. The introduction of new more universal nitroxide mediators will allow for the synthesis of a wide range of gradient copolymers with acrylates and acrylamides (page 779, left column, paragraph "Gradient copolymers from controlled radical polymerizations).

Nesvadba discloses a polymerizabie composition, comprising a) at least one ethylenically unsaturated monomer or oligomer, and b) an initiator compound of formula (I)

(I)



wherein n is 0 or 1. The compounds of formula (I) are prepared from a free radical

and a compound of formula R_{10} NO or

Nesvadba discloses a process for polymerizing ethylenically unsaturated monomers, novel initiator compounds and their use for polymerization, intermediate compounds and also the polymer or copolymer produced by this process (abstract).

Nesvadba discloses that block copolymers are, for example, block copolymers of polystyrene and polyacrylate (e.g., poly(styrene-co-acrylate) or poly(styrene-co-acrylate-co-styrene). They are usefull as adhesives or as compatibilizers for polymer blends or as polymer toughening agents. Poly(methylmethacrylate-co-acrylate) diblock copolymers or Poly(methylacrylate-co- acrylate-co-methacrylate) triblock copolymers) are useful as dispersing agents for coating systems, as coating additives (e.g. rheological agents, compatibilizers, reactive diluents) or as resin component in coatings(e.g. high solid paints) Block copolymers of styrene, (meth)acrylates and/or acrylonitrile are useful plastics, elastomers and adhesives (col. 12, lines 22-33).

Nesvadba discloses that the (co)polymers may have a number average molecular weight from 1 000 to 400 000 g\mol, preferably from 2 000 to 250 000 g/mol and, more preferably, from 2 000 to 200 000 g/mol. When produced in bulk, the number average molecular weight may be up to 500 000 (with the same minimum weights as

mentioned above) (col. 12, lines 39-45). The (co)polymers typically have a low polydispersity. Preferably the polydispersity is from 1.1 to 2.2, more preferably from 1.1 to 1.9 and most preferably from 1.2 to 1.8 (col. 12, lines 52-55).

However, Matyjaszewski et al. and Nesvadba et al. do not disclose or fairly suggest the claimed gradient copolymer comprising at least two different monomer units:

a) the first (M_1), the homopolymer of which has a Tg_1 of less than 20°C, representing at least 50% by weight of the total weight of the copolymer and selected from the group consisting of linear and branched $C_1 - C_{12}$ alkyl acrylates, polyethylene glycol acrylate, polyethylene glycol methacrylate and dienes,

b) the second (M_2), the homopolymer of which has a T_{g2} of greater than 20°C, representing at most 50% by weight of the total weight of the copolymer and selected from the group consisting of styrene, styrene derivatives, acrylic acid, methacrylic acid, norbomyl acrylate, methyl methacrylate, acrylonitrile and methacrylonitrile, wherein at least 5% by weight of the total weight of the copolymer is represented by a hydrophilic monomer unit selected from the group consisting of polyethylene glycol acrylate, polyethylene glycol methacrylate, acrylic acid and methacrylic acid,

said gradient copolymer comprising at least one monomer M_i such that the probability of encountering M_i in any standardized position x situated on the polymer chain is nonzero; and wherein said gradient copolymer is soluble or dispersible in both

water and in organic solvents at a concentration greater than or equal to 5%, and wherein said copolymer has number average and weight average masses of between 5,000 g/mol and 1,000,000 g/mol and a polydispersity index of between 1.1 and 2.5, said copolymer further comprising nitroxide residue unit, as per newly amended claim 1.

9. As of the date of this Notice of Allowability, the Examiner has not located or identified any reference that can be used singularly or in combination with another reference including Matyjaszewski et al. and Nesvadba et al. to render the present invention anticipated or obvious to one of ordinary skill in the art.

10. In the light of the above discussion, it is evident as to why the present claims are patentable over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delay, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reason for Allowance".

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL M. BERNSHTEYN whose telephone number is (571)272-2411. The examiner can normally be reached on M-Th 8-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael M. Bernshteyn/
Examiner, Art Unit 1762

/M. M. B./
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